SHOW ALL YOUR WORK. NO CREDITS FOR ANSWERS WITHOUT JUSTIFICATIONS

(1) (22 points) Find the limit if it exists

\[ \lim_{x \to 3} \frac{x^2 - 3x}{x^2 - 6x + 9} \]

b) \[ \lim_{x \to 2} \frac{\sqrt{x^2 + 5} - 3}{x - 2} \]

c) \[ \lim_{x \to 0} \left( 3 + x^2 e^{\cos \frac{1}{x}} \right) \]

d) \[ \lim_{x \to 0^+} \left( \frac{1}{x} - \ln x \right) \]

**Problem 2:** (6 points) Is the function \( f(x) = [x] + [-x] \) continuous at \( x = 2 \)? If not, what is the type of discontinuity? (Show all your work).

**Problem 3:** (6 points) Use the \( \epsilon - \delta \) definition of limit to show that \( \lim_{x \to 2} (3 - 2x) = -1 \).

Find values of \( \delta \) that correspond to \( \epsilon = 0.06 \)

**Problem 5:** (6 points) Consider the function \( f(x) = \frac{x^2 - 1}{x^2 - 3x - 4} \).

(a) Find all values of \( x \) where the function is discontinuous and state the type of each one.

(b) Find all vertical asymptotes of the function.